

1 **Amendment to the Claims**

2 **In the Claims:**

3 Please amend Claim 1 as follows:

4 1. (Currently Amended) A programmable graphics pipeline for processing multimedia data  
5 comprising:

6 (a) an instruction cache for storing at least graphics and media instructions;  
7 (b) a first register file for storing the multimedia data and intermediate data;  
8 (c) a first vector functional unit in communication with the instruction cache and  
9 the register file, said vector functional unit performing at least graphics and media instructions, to  
10 produce at least graphics and media data; and

11 (d) an enhanced texture cache in communication with the first vector functional  
12 unit, the first vector functional unit obtaining from said enhanced texture cache a vector of at least  
13 one partition of the multimedia data, wherein said enhanced texture cache is not limited to storage of  
14 one type of multimedia data.

15 2. (Previously Cancelled)

16 3. (Previously Presented) The programmable graphics pipeline of Claim 1, wherein the  
17 enhanced texture cache comprises:

18 (a) a line buffer that provides multiple read ports for accessing the multimedia  
19 data; and

20 (b) a cache area in communication with the line buffer, said cache area storing the  
21 multimedia data.

22 4. (Original) The programmable graphics pipeline of Claim 3, further comprising an  
23 enhanced texture address unit in communication with the enhanced texture cache, said enhanced  
24 texture address unit being employed for converting multiple inverse-mapped source coordinates into  
25 absolute memory addresses of the multimedia data in an arbitrary-sized block.

26 5. (Original) The programmable graphics pipeline of Claim 4, wherein the enhanced texture  
27 address unit further generates filter coefficients for the multiple inverse-mapped source coordinates  
28 for one of a bilinear filtering and a trilinear filtering of the data.

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1           6. (Original) The programmable graphics pipeline of Claim 4, further comprising an  
2 enhanced rasterization unit in communication with the enhanced texture address unit, said enhanced  
3 rasterization unit being employed for generating:

- 4                   (a) a plurality of destination coordinates for at least one of:  
5                         (i) a plurality of primitives being rendered; and  
6                         (ii) a media processing output; and  
7                   (b) a plurality of source coordinates for at least one of:  
8                         (i) texture data associated with the plurality of destination coordinates for  
9 the plurality of primitives; and  
10                        (ii) media data associated with the plurality of destination coordinates for  
11 the media processing.

12           7. (Original) The programmable graphics pipeline of Claim 6, wherein the plurality of  
13 primitives include at least one of:

- 14                   (a) dots;  
15                   (b) lines;  
16                   (c) triangles;  
17                   (d) rectangles; and  
18                   (e) polygons.

19           8. (Original) The programmable graphics pipeline of Claim 6, further comprising an  
20 enhanced Z-buffer unit in communication with the enhanced rasterization unit and the enhanced  
21 texture address unit, said enhanced Z-buffer unit being employed for loading source coordinates of a  
22 primitive being rendered to provide the enhanced texture address unit with variable access to the  
23 source coordinates if perspective address generation cannot be used.

24           9. (Original) The programmable graphics pipeline of Claim 8, wherein the enhanced  
25 Z-buffer unit is further employed for determining a depth of a new source pixel in relation to an old  
26 source pixel.

27           10. (Original) The programmable graphics pipeline of Claim 1, further comprising a  
28 blending unit that is in communication with the first vector functional unit, said blending unit being  
29 employed for:

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1 (a) combining a graphics data output from the first vector functional unit with a  
2 color value to produce a blended value; and

3 (b) combining the blended value with a destination pixel value.

4 11. (Original) The programmable graphics pipeline of Claim 1, further comprising an output  
5 buffer in communication with the first vector functional unit, said output buffer being employed for  
6 concatenating one of successive image outputs and successive video outputs from the first vector  
7 functional unit, to reduce a number of subsequent write transactions to a memory.

8 12. (Previously Presented) The programmable graphics pipeline of Claim 1, further  
9 comprising an output buffer in communication with the first vector functional unit and the enhanced  
10 texture cache, said output buffer being employed for:

11 (a) concatenating successive media processing output from the first vector  
12 functional unit to produce concatenated data;

13 (b) providing the concatenated data as input to the enhanced texture cache; and

14 (c) converting a compressed format of destination coordinates into a plurality of  
15 destination addresses for media processing output data.

16 13. (Original) The programmable graphics pipeline of Claim 10, further comprising a write  
17 buffer in communication with the blending unit, said write buffer sending multiple write transactions  
18 to a memory, to reduce page misses.

19 14. (Original) The programmable graphics pipeline of Claim 11, further comprising a write  
20 buffer in communication with the output buffer, said write buffer sending multiple write transactions  
21 to a memory, to reduce page misses.

22 15. (Original) The programmable graphics pipeline of Claim 1, further comprising a  
23 configuration register in communication with the first vector functional unit, said configuration  
24 register providing the first vector functional unit with partitioned data access parameters and a  
25 location of a current instruction thereby instructing the vector functional unit to perform one of a  
26 graphics process and a media process.

27 16. (Original) The programmable graphics pipeline of Claim 1, further comprising:

28 (a) a second vector functional unit in communication with the instruction cache  
29 and performing the graphics and media instructions being performed by the first vector functional  
30 unit, to produce parallel graphics and media data; and

1 (b) a second register file in communication with the second vector functional unit,  
2 said second register file storing additional multimedia data and additional intermediate data.

3 17. (Previously Presented) A method for producing one of graphics pixel data and media  
4 output data, comprising the steps of:

5 (a) obtaining configuration data from a host processor, said configuration data  
6 comprising a partitioned data size and a location of an instruction;

7 (b) performing graphics rendering processing on graphics texture data with a  
8 programmable graphics rendering pipeline to produce graphics pixel data when the partitioned data  
9 size and the instruction correspond to graphics processing; and

10 (c) performing media processing on media source data with the programmable  
11 graphics rendering pipeline to produce media output data when the partitioned data size and the  
12 instruction correspond to media processing.

13 18. (Previously Presented) The method of Claim 17, wherein the step of performing graphics  
14 rendering processing comprises the steps of:

15 (a) producing a destination coordinate;

16 (b) producing a mapped texture coordinate corresponding to the destination  
17 coordinate;

18 (c) producing a plurality of surrounding memory addresses in which surrounding  
19 texture data are stored, said surrounding texture data corresponding to a plurality of surrounding  
20 texture coordinates surrounding the mapped texture coordinate;

21 (d) retrieving the surrounding texture data from the plurality of surrounding  
22 memory addresses, and storing the surrounding texture data retrieved in a cache; and

23 (e) performing interpolation on the surrounding texture data in the cache to  
24 determine a texture value at the mapped texture coordinate as the graphics pixel data for the  
25 destination coordinate.

26 19. (Original) The method of Claim 17, wherein the step of performing media processing  
27 corresponds to image processing comprises the steps of:

28 (a) producing a destination coordinate;

29 (b) producing at least one mapped image coordinate corresponding to the  
30 destination coordinate;

1 (c) producing at least one memory address where image data are stored  
2 corresponding to the at least one mapped image coordinate;

3 (d) retrieving the image data from the at least one memory address, and storing the  
4 image data retrieved in a cache; and

5 (e) performing an image manipulation function on the image data in the cache to  
6 produce image pixel data at the destination coordinate as the media output data.

7 20. (Original) The method of Claim 17, wherein the step of performing media processing  
8 corresponds to video processing comprises the steps of:

9 (a) producing a destination coordinate;

10 (b) producing at least one mapped video coordinate corresponding to the  
11 destination coordinate;

12 (c) producing at least one memory address where video data are stored  
13 corresponding to the at least one mapped image coordinate;

14 (d) retrieving the video data from the at least one memory address, and storing the  
15 video data retrieved in a cache; and

16 (e) performing a video manipulation function on the video data to produce video  
17 pixel data at the destination coordinate as the media output data.

18 21. (Previously Presented) The method of Claim 17, wherein the programmable graphics  
19 rendering pipeline is employed for executing at least one of a partitioned inner product instruction, a  
20 partitioned arithmetic instruction, a partitioned logic instruction, a data movement instruction, and a  
21 loop-control instruction, to produce at least one of the graphics pixel data and the media output data.

22 22. (Previously Presented) The method of Claim 17, further comprising the step of storing  
23 the one of the graphics pixel data and the media output data in memory.

24 23. (Previously Presented) A programmable graphics pipeline for multimedia applications  
25 that performs graphics and media functions, comprising:

26 (a) a vector streaming engine that accesses variable length data from a memory  
27 and writes pixel data to the memory, wherein the variable length data comprise one of graphic texture  
28 source data and media source data, and wherein the pixel data are one of graphics pixel data and  
29 media pixel data; and

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1 (b) a vector processing engine in communication with the vector streaming engine,  
2 said vector processing engine generating the pixel data from the variable length data.

3 24. (Original) The programmable graphics pipeline of Claim 23, wherein the vector  
4 streaming engine comprises:

5 (a) a vector input unit in communication with the vector processing engine; and

6 (b) a vector output unit in communication with the vector processing engine.

7 25. (Previously Presented) The programmable graphics pipeline of Claim 24, wherein the  
8 vector input unit comprises:

9 (a) an enhanced rasterization unit that generates at least one of:

10 (i) a destination coordinate corresponding to one of a graphics pixel  
11 location and a media pixel location; and

12 (ii) a source coordinate for one of a graphics texture source, and a media  
13 source; and

14 (b) an enhanced texture address unit in communication with the enhanced  
15 rasterization unit, said enhanced texture address unit generating a memory address corresponding to  
16 the source coordinate, said memory address defining a storage location for one of the graphics texture  
17 source data and the media source data; and

18 (c) a texture cache in communication with the enhanced texture address unit, said  
19 texture cache storing said one of the graphics texture source data and the media source data for use by  
20 the vector processing engine.

21 26. (Original) The programmable graphics pipeline of Claim 24, wherein the vector output  
22 unit comprises:

23 (a) a blending unit in communication with the vector processing engine, said  
24 blending unit performing blending operations on graphics pixel data;

25 (b) an output buffer in communication with the vector processing engine, said  
26 output buffer being employed for concatenating a plurality of media pixel data; and

27 (c) a write buffer in communication with both the blending unit and the output  
28 buffer, said write buffer writing one of the graphics pixel data and the media pixel data to memory in  
29 burst groups.

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1           27. (Previously Presented) The programmable graphics pipeline of Claim 23, wherein the  
2 vector processing engine comprises:

3               (a) a first vector functional unit in communication with the vector streaming  
4 engine, said first vector functional unit being usable for graphics rendering processing functions and  
5 media processing functions;

6               (b) an instruction cache in communication with the vector functional unit, said  
7 instruction cache storing at least one machine instruction to be executed by the vector functional unit;  
8 and

9               (c) a first register file in communication with the first vector functional unit, said  
10 first register file storing intermediate data for use by the first vector functional unit.

11           28. (Original) The programmable graphics pipeline of Claim 27, wherein the vector  
12 processing engine comprises:

13               (a) a second vector functional unit in communication with the vector streaming  
14 engine, and in communication with the instruction cache, said second vector functional unit being  
15 usable for performing graphics processing functions and media processing functions in parallel with  
16 the first vector functional unit; and

17               (b) a second register file in communication with the second vector functional unit,  
18 said second register file storing intermediate data for use by the second vector functional unit.

19           29. (Original) The programmable graphics pipeline of Claim 23, further comprising a  
20 configuration register in communication with both the vector streaming engine and the vector  
21 processing engine, said configuration register providing a partitioned data size and a location of an  
22 instruction indicating operation of the programmable pipeline for one of graphics processing and  
23 media processing.

24           30. (Previously Presented) A method for performing one of a graphics function and a media  
25 function on variable length data with a programmable graphics pipeline, comprising the steps of:

26               (a) using a vector streaming engine:  
27                       (i) generating a plurality of output pixel coordinates;  
28                       (ii) generating a plurality of memory addresses corresponding to the output  
29 pixel coordinates at which are stored one of graphics texture data and media source data, wherein the  
30 graphics texture data and the media source data are not of equal length; and

1 (iii) caching said one of the graphics texture data and the media source data  
2 in a cache;  
3 (b) passing data retrieved from the cache to a vector processing engine; and  
4 (c) performing one of the graphics function and the media function on the data  
5 retrieved from the cache using the vector processing engine.  
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